IN THE CLAIMS:

1. - 34. (cancelled)

35. (previously presented) A system for controlling the X-ray output of an X-ray tube, said system comprising:

an X-ray tube that emits an X-ray output in response to a control signal;

an X-ray transmissive X-ray detector through which at least a portion of said X-ray output passes that detects X-rays emitted from said X-ray tube, and provides a detected X-ray signal indicative of a property of the X-rays that are emitted by the X-ray tube; and

a control system that receives said detected X-ray signal and adjusts said control signal responsive to changes in conditions within said X-ray tube to ensure that said X-ray output is substantially maintained at a predetermined value.

36. (previously presented) The system as claimed in claim 35, wherein said changes in conditions within the X-ray tube include changes in leakage currents within the X-ray tube.

37. (previously presented) The system as claimed in claim 35, wherein said changes in conditions within the X-ray tube include changes any of the size, shape or location of a focal spot of electrons on an anode within the X-ray tube.

38. (previously presented) The system as claimed in claim 35, wherein said detected X-ray signal is maintained at a substantially constant value by said control system.

39. (previously presented) The system as claimed in claim 35, wherein said property of the X-rays that are emitted by the X-ray tube is the intensity of the X-rays that are emitted from the X-ray tube.

40. (previously presented) The system as claimed in claim 35, wherein said X-ray tube comprises an X-ray window through which the X-rays pass, and said X-ray detector is positioned adjacent to said X-ray window.

41. (previously presented) The system as claimed in claim 40, wherein said X-ray detector partially covers said X-ray window.

42. (previously presented) The system as claimed in claim 40, wherein said X-ray detector completely covers said X-ray window.

43. (previously presented) The system as claimed in claim 40, wherein substantially all of said X-ray output that passes through the X-ray window impinges on the X-ray transmissive X-ray detector.

44. (previously presented) The system as claimed in claim 40, wherein said system further includes an X-ray anode that is positioned near the X-ray window.

45. (previously presented) The system as claimed in claim 40, wherein said X-ray window comprises an X-ray transmissive anode.

46. (previously presented) The system as claimed in claim 40, wherein said system further includes a filter and wherein substantially all of said X-ray output that passes through the X-ray window impinges on the filter.

47. (previously presented) The system as claimed in claim 35, wherein said X-ray detector provides a filter function.

48. (previously presented) The system as claimed in claim 35, wherein said X-ray detector is configured and arranged as a segmented detector that includes a plurality of detector elements.

49. (previously presented) The system as claimed in claim 48, wherein at least one of said detector elements includes a filter.

50. (previously presented) The system as claimed in claim 48, wherein said property of the X-rays is provided by a ratio of detected X-ray signals from at least two of said detector elements.

51. (previously presented) The system as claimed in claim 35, wherein said X-ray tube includes an X-ray producing target and said X-ray detector is positioned substantially close to said X-ray producing target.

52. (previously presented) The system as claimed in claim 35, wherein said control signal is a current control signal.

53. (previously presented) The system as claimed in claim 52, wherein said current control signal controls the temperature of a cathode in the X-ray tube.

54. (previously presented) The system as claimed in claim 35, wherein said X-ray detector comprises at least one of a photodiode, a pin diode, an ionization detector, a scintillation detector, an electron multiplier, and a charge-coupled device.

55. (previously presented) The system as claimed in claim 35, wherein said system is included within a battery powered device.

56. (previously presented) The system as claimed in claim 35, wherein said system is included in a hand-held device.

57. (previously presented) The system as claimed in claim 35, wherein said system is configured for use as an X-ray fluorescence analytical instrument.

58. (cancelled)

59. (cancelled).

60. (cancelled)

61. (previously presented) A system for controlling the X-ray output of an X-ray tube, said system comprising:

an X-ray tube that emits an X-ray output through a window in response to a control signal;

an X-ray detector that is on said window and on which at least some of the X-ray output impinges, said X-ray detector providing a detected X-ray signal indicative of a property of the X-rays that are emitted by the X-ray tube through the window; and

a control system that receives said detected X-ray signal and adjusts said control signal responsive to changes in conditions within said X-ray tube to ensure that said X-ray output is substantially maintained at a predetermined value.

62. (previously presented) The system as claimed in claim 61, wherein said changes in conditions within the X-ray tube include changes in leakage currents within the X-ray tube.

63. (previously presented) The system as claimed in claim 61, wherein said changes in conditions within the X-ray tube include changes in any of the size, shape or location of electrons on an anode within the X-ray tube.

64. (previously presented) A method of controlling the X-ray output of an X-ray tube, said method comprising the steps of:

providing an X-ray tube that emits an X-ray output in response to a control signal;

providing an X-ray transmissive X-ray detector through which at least a portion of said X-ray output passes that detects X-rays emitted from said X-ray tube,

providing a detected X-ray signal indicative of a property of the X-rays that are emitted by the X-ray tube; and

adjusting said control signal responsive to changes in conditions within the X-ray tube to ensure that said detected X-ray signal is substantially maintained at a predetermined value.

65. (previously presented) The method as claimed in claim 64, wherein said X-ray tube includes an X-ray output window and said X-ray detector is positioned substantially close to said X-ray window.

66. (previously presented) The method as claimed in claim 64, wherein substantially all of said X-ray output from the window impinges on said X-ray detector.

67. (previously presented) The method as claimed in claim 64, wherein said X-ray tube includes an X-ray producing target and said X-ray detector is positioned substantially close to said X-ray producing target.

68. (previously presented) A method of controlling the X-ray output of an X-ray tube, said method comprising the steps of:

providing an X-ray tube that emits an X-ray output through a window in response to a control signal;

providing an X-ray detector that on the window and on which at least a portion of said X-ray output impinges,

providing a detected X-ray signal indicative of a property of the X-rays that are emitted

by the X-ray tube; and

adjusting said control signal responsive to changes in conditions within the X-ray tube to ensure that said detected X-ray signal is substantially maintained at a predetermined value.

69. (previously presented) The method as claimed in claim 68, wherein said X-ray detector is transmissive.

70. (previously presented) The method as claimed in claim 68, wherein said X-ray tube includes an X-ray producing target and said X-ray detector is positioned substantially close to said X-ray producing target.